



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/757,834	01/08/2001	Franz W. Ulrich	139.039US1	8222

21186 7590 12/29/2003

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER

STREGE, JOHN B

ART UNIT	PAPER NUMBER
----------	--------------

2625

DATE MAILED: 12/29/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/757,834

Applicant(s)

ULRICH ET AL.

Examiner

John B Strege

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/08/01.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 290-326 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 290-293, 296, 297, 299, 307, 309, 317, 320, 321 and 323-326 is/are rejected.
- 7) ☒ Claim(s) 294, 295, 298, 308, 318, 319 and 322 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

1. There are two declarations included with the case, one with two inventors (Ulrich and Bieman) and another with unsigned declarations by 8 applicants. It is unclear which declaration is to be used for the applicant. Applicant should select one of the two declarations as the official copy.

Examiners Comment

2. It appears that the application is a continuation of PCT/US99/15411 however no search report is included. If the applicant has a search report it is requested that he please submit it in response to this office action.

Claim Objections

3. Claim 321 is objected to because it depends upon itself. A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim. Appropriate correction is required.

PLEASE NOTE: Examiner will assume that claim 321 depends on claim 320 and examine accordingly.

4. Claim 314 is objected to because the grammar is awkward and the meaning unclear. Line 20 recites, "scanning the device within the spatial-modulation patterned light." Examiner assumes that the device is scanned at the intersection of the spatial-modulation patterned light with the device. Appropriate correction is required.

5. Claim 303 is objected to because the grammar is misleading. Lines 2-3 state that "the second light source being activated to obtain two-dimensional intensity data about the device from the imager." The light source in the specification can not obtain data and this is contrary to the use of a light source. The examiner will assume that the light source is activated in order to allow the imager to obtain two-dimensional intensity data about the device. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 290-291, and 300-301 are rejected under 35 U.S.C. 102(b) as being anticipated by Bieman et al. USPN 5,636,025 (hereinafter "Bieman").

Claim 290 recites, "A machine-vision head for measuring a three-dimensional geometry of a device having a surface to be measured." Bieman discloses a machine vision head (figures 1,2,6 and 12) that measures the three-dimensional surface contours of a device (as stated at least in col. 1 lines 14-16).

Claim 290 further recites that the invention comprises, "a projector, the projector including: a first light source having a projection optical axis that intersects the device; a projection-imaging element positioned along the projection optical axis and spaced from the first light source; and a projection-pattern element positioned between the first light source and the projection imaging element along the projection optical axis, the projection pattern element having a repeating sine-wave light-modulation pattern as measured along a line on the projection-pattern element." As can be clearly seen in figure 6 the invention disclosed by Bieman contains an illumination means 12 that is provided to project a grating pattern to intersect the surface of a device. The grating pattern is produced by an optical grating element 16 that is positioned between the light source of the projector 14 and a focusing lens 18 (col. 4 lines 60-67). It is also explicitly disclosed that the grating is sinusoidal (col. 5 line 1).

Claim 290 further discloses, "an imager, the imager having a reception optical axis that intersects the device substantially at the projection optical axis." Bieman discloses a lens 24 for capturing or acquiring the image, and an imaging device 26 which may be a camera (col. 5 lines 9-11). It can be seen in figure 6 that the reception optical axis intersects the device substantially at the projection optical axis.

Claim 291 discloses, "The machine-vision head according to claim 290, wherein the projection-pattern element light-modulation pattern includes a repeating pattern of grid lines having substantially constant density along lines in a direction parallel to the grid lines and a sine-wave density along lines in a direction perpendicular to the grid lines." Bieman discloses that the sinusoidal grating shows a plot of light intensity versus

distance along a line perpendicular to the grating lines will resemble a sinusoidal function (col. 6 lines 23-26). Although it is not explicitly stated that the grid lines have constant density along lines in a direction parallel to the grid lines and a sine-wave density along lines in a direction perpendicular to the grid lines, it is inherent that this must be true in order to produce the sinusoidal figure.

Claim 300 discloses, "The machine-vision head according to claim 290, further comprising a focussing reflector that substantially focusses an image of the first light source adjacent to the first light source." Bieman discloses a mirror used to reflect a portion of the projected image at a different angle (col. 11 lines 52-55). As can be seen in Fig. 6 a mirror 46 reflects the light source onto surface 44 which in turn focuses the image onto mirror 48 that is adjacent to the first light source.

Claim 301 discloses, "the machine-vision head according to claim 300, wherein the reception optical axis is oriented to be at substantially a right angle to a direction of scanning, and the projection optical axis is oriented to be at substantially a forty-five-degree angle to the direction of scanning." As disclosed by Bieman the altering means of the contour interval moves from left to right to change the distance label D in figure 6 (col. 5 lines 50-56). As the movement of the altering means changes the pattern, and the camera captures these changes then this is a type of scanning that is in the horizontal direction. As can be seen in the figure the reception optical axis is oriented to be at substantially at 90 degrees to the horizontal. If the distance D is made to be equal to the distance H, or at least somewhere close to it then the direction of the projection would be substantially a forty-five degree angle to the horizontal.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 292 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Magyar, Jr. et al. USPN 5,469,249 (hereinafter "Magyar"). Claim 292 discloses, "the machine-vision head according to claim 291, wherein the first light source includes a elongated incandescent filament having a dimension along a longitudinal axis substantially longer than a width, wherein the longitudinal axis of the filament is substantially perpendicular to the projection optical axis and substantially parallel to the grid lines of the projection-pattern element." Bieman does not explicitly disclose using an incandescent light source, however it would work suitably for the purpose of his invention.

It is inherent that an incandescent light bulb would have a filament substantially perpendicular to the projection optical axis. It would be obvious to make the light bulb filament go parallel to the grid so that the line of light created by the filament would pass through and not get cut off as it would if it were not allowed. One such reference that

shows that this is obvious is Magyar. Magyar teaches "if an incandescent bulb or halogen bulb is used as the illumination source, the opening 40 should be in the form of an elongated slit aligned with the filament of the bulb. Of course, it is to be understood that other light sources can also be used" (last paragraph of column 6 continued onto column 7).

Bieman and Magyar are analogous art because they are from the same field of endeavor of using light sources.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman with Magyar. The motivation for doing so would be to use a light source that is readily available in a way that would project light in the desired fashion.

Therefore it would have been obvious at the time of the invention to one of ordinary skill in the art to combine Bieman and Magyar in order to obtain the invention as specified in claim 292.

10. Claim 293 is rejected under 35 U.S.C 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Magyar, Jr. et al. USPN 5,469,249 (hereinafter "Magyar") and further in view of Svetkoff et al USPN Re. 36,560 (hereinafter "Svetkoff").

Claim 293 discloses, "the machine-vision head according to claim 292, further comprising a projection mask having an elongated aperture having a dimension along a length axis substantially longer than a dimension along a width axis perpendicular to the

length axis, and wherein the length axis is substantially parallel to the grid lines of the projection-pattern element." Bieman does not explicitly disclose a projection mask.

Svetkoff discloses a mask 44 (Fig. 1) that is used to provide a spatial and polarization filtering plane (col. 7 lines 30-46). The mask forms a rectangular aperture used to reject background noise. As the mask is used for filtering it is inherent that it would be have a length axis substantially parallel to the grid lines so that it can reduce background noise instead of the light that is desired to be transmitted.

Bieman and Svetkoff are from the same field of endeavor of machine vision and Bieman Svetkoff and Magyar are all from the same field of endeavor of using light sources.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman, Svetkoff, and Magyar in order to obtain the invention as specified in claim 293. The motivation for the combination would be to mask out undesired background noise that is caused by the light source.

11. Claims 296-297 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Svetkoff et al. USPN Re. 36,560 (hereinafter "Svetkoff"). Claim 296 discloses, "The machine-vision head according to claim 290, further comprising a light intensity controller, coupled to receive intensity information regarding light output from the first light source, that outputs a control signal based on a measured intensity of light from the first light source." Bieman does not explicitly disclose a light intensity controller.

Svetkoff discloses a controlled source of light, a modulator, and an optical feedback circuit 12 as seen in figure 1 (col. 6 lines 24-26). In order to have a controlled light source it is inherent that there must be a light intensity controller that outputs a control signal based on a measured intensity of light.

Bieman and Svetkoff are analogous art because they are from the same field of endeavor of machine vision.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman and Svetkoff. The motivation for doing so would be to allow for uniform intensity of the light used in order to make more reliable measurements.

Therefore it would have been obvious to one of ordinary skill in the art to combine Bieman and Svetkoff in order to obtain the invention as disclosed in claim 296.

Claim 297 recites, "The machine-vision head according to claim 296, wherein the control signal is operatively coupled to the first light source to control light output based on the measured light intensity in a feedback manner." This is disclosed by Svetkoff as stated above in the rejection of claim 296.

12. Claim 299 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Tanaka USPN 5,621,218.

Claim 299 discloses, "The machine-vision head according to claim 290, further comprising a condensing imaging element positioned between the first light source and the projection-pattern element along the projection optical axis. " Although Bieman discloses a lens, he does not explicitly state that it could be a condensing lens.

Tanaka discloses an inspecting apparatus wherein a condensing lens 304a is disclosed as can be seen in figure 3 to allow for a light source to be focused onto a determined point (col. 4 lines 56-62).

Bieman and Tanaka are analogous art because they are from the same field of endeavor of inspecting systems.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman and Tanaka. The motivation for using the condensing lens that Tanaka discloses would be to allow the pattern used by Bieman to be focused onto different regions with varying focus areas.

Therefore it would have been obvious to one of ordinary skill in the art to combine Bieman and Tanaka in order to obtain the invention as specified in claim 299.

13. Claim 302 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Langer et al. USPN 5,460,758 (hereinafter "Langer"). Claim 302 discloses, "The machine-vision head according to claim 301, wherein a major plane of the projection-imaging element is oriented substantially perpendicular to the projection optical axis and a major plane of the projection-pattern element is oriented substantially perpendicular to the projection optical axis." As can be seen in figure 6 of Bieman the major plane of the projection imaging element is parallel to the major plane of the projection-pattern element and it is arguable that the angle that is formed with the optical axis of both is substantially at a right angle. The choice of angle seems to be a design choice that does not have much

relevance on the novelty of the invention. For arguing purposes the examiner will assume that Bieman does not explicitly disclose that the angle formed with the optical axis is a right angle.

In figure 1 Langer discloses a light source 15, a modulation apparatus 20 in the form of projection grating, and an imaging element 17. The optical axis formed by the light source and the intersection of the device is perpendicular to both the modulation apparatus and the imaging element.

Bieman and Langer are analogous art because they are both in the same field of endeavor of producing modulated images.

At the time of the invention it would have been obvious to combine Bieman with Langer. One such motivation for combining the references to form right angles between the optical axis and the two elements would be set up the projection system in such a way as that existing equipment may be used to carry out the invention such as a flashlight with the modulator placed before the lens.

Therefore it would be obvious to one of ordinary skill in the art to combine Bieman and Langer in order to obtain the invention as disclosed in claim 302.

14. Claim 303 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Kobayashi et al USPN 5,039,868 (hereinafter "Kobayashi"). Claim 303 recites, "The machine-vision head according to claim 290, further comprising a second light source that directs substantially unpatterned light onto the device, the second light source being activated

to obtain two-dimensional intensity data about the device from the imager." Figure 12 shows another embodiment of the invention by Bieman that contains all of the elements of the previous embodiment and also discloses two different projection systems comprising 2 separate light sources (14 and 14a) (col. 11 lines 36-43). Although it is not explicitly disclosed that the second light source is added to allow the imager to obtain two-dimensional intensity data about the device this is inherent. Bieman does not explicitly disclose that the second light source uses substantially unpatterned light.

Kobayashi discloses a projection unit that comprises three ring shaped light sources 63, 64, and 65 that direct white light to the parts to be inspected in order to allow at least an imaging unit to form an image of the parts (last paragraph of col. 13 continued onto column 14).

Bieman and Kobayashi are from the same field of endeavor of inspecting a surface.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman with Kobayashi in order to obtain multiple light sources, one of which directs unpatterned light onto the device that is used to obtain two-dimensional intensity data about the device from the imager. The motivation for doing this would be to further illuminate the object in the invention of Bieman with a light source that uses unpatterned light, thus permitting a better two-dimensional image to be obtain by the imager.

15. Claim 314 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Bieman USPN 5,646,733.

Claim 314 discloses, "A method for measuring a three-dimensional geometry of a device having a surface to be measured, comprising: projecting patterned light having a spatial-modulation pattern; the projecting pattern light including: projecting substantially unpatterned light; spatially modulating the unpatterned light with a sine-wave spatial modulation pattern to produce spatial-modulation patterned light; and imaging the spatial-modulation patterned light onto the device; scanning the device within the spatial-modulation patterned light; and receiving reflected light from the device into at least three linear imager regions." Bieman (5,636,025) discloses a method for optically measuring the surface contour of a part, and since it is a contour it is measuring a three-dimensional geometry (as stated at least in col. 1 lines 14-16). As can be clearly seen in figure 6 the invention disclosed contains an illumination means 12 that projects unpatterned light. This unpatterned light passes through a grating element 16 in order to produce spatially modulated light (col. 4 lines 60-67). It is also explicitly disclosed that the grating pattern is sinusoidal (col. 5 line 1). This pattern is imaged onto a device surface 20. The entire pattern is received by lens 24 for capturing or acquiring the image, and an imaging device 26 which may be a camera (col. 5 lines 9-11). The contour interval of the pattern is varied allowing for different images of the pattern to be captured which is considered to be scanning (col. 5 lines 50-56). Bieman (5,636,025) does not explicitly disclose that the reflected light from the device is received into at least three linear imager regions.

Bieman (5,646,733) discloses a camera used to acquire an image and teaches, "the camera 24 may be the Kodak CCD chip model KLI-2103 which has 3 rows of detector or sensing elements 25" (col. 3 lines 54-56).

Bieman (5,636,025) and Bieman (5,646,733) are analogous art because they are from the same field of endeavor of machine vision and more specifically of measuring dimensional characteristics of an object.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman (5,636,025) with the teachings of Bieman (5,646,733) in order to obtain the invention as specified in claim 314. The motivation for using the Kodak CCD chip with 3 rows of sensing elements would be to use a product that is already produced as one of the elements of the invention. As stated above Bieman (5,636,025) recites that a camera may be used, therefore it would be logical to use a camera that already exists to fulfill that requirement.

Therefore it would have been obvious to one skilled in the art to combine Bieman (5,636,025) with the teachings of Bieman (5,646,733) in order to obtain the invention as specified in claim 314.

16. Claims 314-315, and 324-325 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680.

The limitations of claim 314 are stated above as well as what limitations Bieman (5,636,025) discloses. As stated Bieman does not explicitly disclose that the reflected

Art Unit: 2625

light from the device is received into at least three linear imager regions. However, in figure 6 an imaging device 26 is disclosed which may be a camera (col. 5 lines 9-11). It should be noted that a camera can be used as a scanner.

Rhoads discloses that, "a color scanner generally has three rows of detectors" (col. 7 lines 13-15).

Bieman and Rhoads are analogous art because they are from the same field of endeavor of receiving imaging information and further using Moire effects.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman and Rhoads in order to use a color scanner to receive the reflected light from the device into at least three linear imager regions. The motivation would be to use a color scanner so that further processing can be done based upon the RGB characteristics of the obtained images.

Therefore it would have been obvious to one of ordinary skill in the art to combine Bieman and Rhoads in order to obtain the inventions as specified in claim 314.

Claim 315 recites similar limitations to that of claim 291, thus the argument used for claim 291 equally applies to claim 315.

Claim 324 recites, "the method according to claim 314, further comprising reflectively focussing to substantially focus an image of the light source adjacent to the light source." Bieman discloses a mirror used to reflect a portion of the projected image at a different angle (col. 11 lines 52-55). As can be seen in Fig. 6 a mirror 46 reflects the light source onto surface 44 which in turn focuses the image onto mirror 48 that is adjacent to the first light source.

Claim 325 discloses, "The method according to claim 314, wherein the reception optical axis is oriented to be at substantially a right angle to a direction of scanning, and the projection optical axis is oriented to be at substantially a forty-five-degree angle to the direction of scanning." This claim is similar to claim 301 and as shown in the argument Bieman discloses all of the limitations.

17. Claim 323 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680 and further in view of Tanaka USPN 5,621,218.

Claim 323 discloses, "The method according to claim 314, further comprising condensing light onto the projection-pattern along the projection optical axis."

As disclosed above the combination of Bieman and Rhoads covers all of the limitations of claim 314. Neither Bieman nor Rhoads explicitly discloses condensing light onto the projection pattern.

As discussed above Tanaka discloses a condensing lens. The same argument used above for claim 299 can also be applied to claim 323. If a condensing lens were included to focus the image it would be obvious to put the lens along the projection optical axis.

18. Claim 326 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680 and further in view of Womack et al. USPN 5,085,502 (hereinafter "Womack").

Claim 326 discloses, "a computer-readable medium having computer-executable instructions thereon to cause a suitably configured information-handling system to perform the method according to claim 314." Bieman does not explicitly disclose that the system disclosed by his invention is run by a computer-readable medium.

Womack discloses a vision computer 22 in figure 1 that is connected to the camera 20 and enables the system to perform a method (last paragraph of column 6 continuing to column 7).

Bieman, Rhoads, and Womack are all from the same field of endeavor of machine vision. At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman, Rhoads, and Womack. The motivation for doing so would be to allow the system to be automated such as many machine vision systems are. Therefore it would have been obvious to one of ordinary skill in the art to combine Bieman, Rhoads, and Womack in order to obtain the invention as specified in claim 326.

19. Claim 316 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680 and further in view of Magyar, Jr. et al. USPN 5,469,249 (hereinafter "Magyar").

Claim 316 is similar to claim 292, thus the same argument used for claim 292 applies equally for claim 316.

20. Claim 317 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680 in

view of Magyar, Jr. et al. USPN 5,469,249 (hereinafter "Magyar") and further in view of Svetkoff et al USPN Re. 36,560 (hereinafter "Svetkoff").

Claim 317 is similar to claim 293, thus the same argument used for claim 293 applies equally for claim 317.

21. Claims 320-321 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680 and further in view of Svetkoff et al USPN Re. 36,560 (hereinafter "Svetkoff").

Claim 320 recites, "The method according to claim 314, further comprising generating a light-intensity control signal based on intensity information regarding the projected light." Bieman nor Rhoads explicitly disclose this.

Svetkoff discloses a controlled source of light, a modulator, and an optical feedback circuit 12 as seen in figure 1 (col. 6 lines 24-26). In order to have a controlled light source it is inherent that there must be a light intensity control signal based on a measured intensity of light.

Bieman, Rhoads, and Svetkoff are analogous art because they are from the same field of endeavor of machine vision.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Bieman, Rhoads, and Svetkoff. The motivation for doing so would be to allow for uniform intensity of the light used in order to make more reliable measurements.

Therefore it would have been obvious at the time of the invention to one of ordinary skill in the art to combine Bieman, Rhoads, and Svetkoff in order to obtain the invention as specified in claim 320.

Claim 321 recites, "The method according to claim 321, further comprising controlling a light source to control light output based on the measured light intensity in a feedback manner." As discussed above in the rejection of claim 320 this is disclosed by Svetkoff.

22. Claims 304-305, 310 and 312 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680 and further in view of Kawachi et al USPN 6,285,787 (hereinafter "Kawachi"). Claim 304 discloses, "A machine-vision system for inspecting a device, comprising: (1) an inspection station, the inspection station including: (a) a projector, the projector including: a first light source having a projection optical axis that intersects the device;
a projection-imaging element positioned along the projection optical axis and spaced from the first light source; and a projection-pattern element positioned between the first light source and the projection imaging element along the projection optical axis, the projection-pattern element having a repeating sine-wave light-modulation pattern as measured along a line on the projection-pattern element; and (b) an imager, the imager having a reception optical axis that intersects the device when the inspection station is

in operation, the imager maintained in a substantially fixed relationship to the pattern projector, the imager including at least three lines of semiconductor imaging pixels (2) a scanner mechanism that moves the imager relative to the device such that different portions of the device are successively imaged by the imager, wherein the first light source is activated in conjunction with the imager to obtain three-dimensional device geometry data regarding the device; and (3) a comparator coupled to the imager, the comparator comparing one or more characteristics of the acquired three-dimensional device geometry data with an intended predetermined geometry to produce a signal indicative of any device geometry departure of an actual device geometry from the intended predetermined geometry.

As discussed above Bieman for the rejection of claim 314 Bieman and Rhoads combined disclose all of the limitations of part (1) of the claim. Official notice is taken for part (2) of the claim where the scanner mechanism moves the imager. Finally part (3) is not explicitly disclosed by Bieman or Rhoads. In figure 1 Kawachi discloses a comparator 4 that is coupled to an image pickup controller 23 that includes a predetermined geometry 47, an actual device geometry 48, and an output unit 51 producing a judgment result about the quality of the object 1.

Bieman, Rhoads, and Kawachi are all analogous art because they are from the same field of endeavor of machine vision.

At the time of the invention it would have been obvious at the time of the invention to one of ordinary skill in the art to combine Bieman, Rhoads, and Kawachi. The motivation for doing so would be to be able to use the inventions such as specified by

Bieman and Rhoads in order to obtain images of a surface and then make comparisons with an ideal surface such as is specified by Kawachi.

Therefore it would have been obvious at the time of the invention to one of ordinary skill in the art to combine Bieman, Rhoads, and Kawachi in order to obtain the invention as disclosed in claim 304.

Claim 305 is similar to claim 315 and the same argument used for claim 315 can be used to reject claim 305.

Claim 310 is similar to claim 324, thus the same arguments used to reject claim 324 can be used to reject claim 310.

Claim 312 is similar to claim 325, thus the same arguments used to reject claim 325 can be used to reject claim 312.

23. Claim 309 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680, further in view of Kawachi et al USPN 6,285,787 (hereinafter "Kawachi"), and further in view of Svetkoff et al USPN Re. 36,560 (hereinafter "Svetkoff").

Claim 309 is similar to claims 320, thus the same arguments used to reject claim 320 can be used to reject claim 309.

24. Claim 311 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680, in view of Kawachi et al USPN 6,285,787 (hereinafter "Kawachi") and further in view of Tanaka USPN 5,621,218.

Claim 311 is similar to claim 323, thus the same arguments used to reject claim 323 can be used to reject claim 311.

25. Claim 313 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680, in view of Kawachi et al USPN 6,285,787 (hereinafter "Kawachi") and further in view of Kobayashi et al USPN 5,039,868 (hereinafter "Kobayashi").

Claim 313 is similar to claim 303, thus the same arguments used to reject claim 303 can be used to reject claim 313.

26. Claim 306 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680, in view of Kawachi et al USPN 6,285,787 (hereinafter "Kawachi") and further in view of Magyar, Jr. et al. USPN 5,469,249 (hereinafter "Magyar").

Claim 306 is similar to claim 292, thus the same arguments used to reject claim 292 can be used to reject claim 306.

27. Claim 307 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bieman et al. USPN 5,636,025 (hereinafter "Bieman") in view of Rhoads USPN 6,320,680, further in view of Kawachi et al USPN 6,285,787 (hereinafter "Kawachi"), further in view of Magyar, Jr. et al. USPN 5,469,249 (hereinafter "Magyar"), and further in view of Svetkoff et al USPN Re. 36,560 (hereinafter "Svetkoff").

Claim 307 is similar to claim 293, thus the same arguments used to reject claim 293 apply equally to claim 307.

Allowable Subject Matter

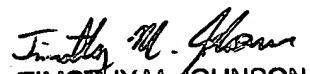
28. Claims 294-295, 298, 308, 318-319, 322 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B Strege whose telephone number is (703) 305-8679. The examiner can normally be reached Monday-Friday between the hours of 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3800.


TIMOTHY M. JOHNSON
PRIMARY EXAMINER